



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/932,236	08/16/2001	Haining Yang	MI22-1725	4828
21567	7590	10/18/2005	EXAMINER	
WELLS ST. JOHN P.S. 601 W. FIRST AVENUE, SUITE 1300 SPOKANE, WA 99201			MITCHELL, JAMES M	
			ART UNIT	PAPER NUMBER
			2813	

DATE MAILED: 10/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/932,236

Applicant(s)

YANG, HAINING

Examiner

James M. Mitchell

Art Unit

2813

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 July 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 55,59 and 70 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 55,59 and 70 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 5/10/05, 7/28/05.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to applicant's amendment filed July 28, 2005.

The indicated allowability of claims 58 and 70 is withdrawn in view of the newly discovered reference(s). Rejections based on the newly cited reference(s) follow.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 55 and 70 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nabatame (U.S. 2004/0214392) in combination with Joo et al. (U.S. 2002/0056839).

4. Nabatame (Fig. 7) discloses:

(cl. 55) a method of forming a conductive material, comprising: providing a semiconductor substrate (71); forming an insulative material (74) over the substrate, wherein the insulative material comprises sidewalls defining an opening extending to the substrate in at least one cross-section; forming a first conductive material (73) over the substrate and within the opening, the first conductive material comprising one or more of TiN, WN, TaN, elemental Ta, and elemental Ti; depositing a second conductive material (75) physically against the first conductive material, the second conductive material consisting essentially of a metal and being different than the first conductive material "Ru"; Par. 0046), wherein the depositing comprises: providing a metallo-organic

Art Unit: 2813

precursor proximate the first conductive material, wherein the metallo-organic precursor comprises the metal and carbon (Par. 0022; 0043); and exposing the precursor to a reducing atmosphere ("dissolved"; Par. 0022) to release the metal from the precursor to form the second conductive material physically against the first conductive material without an insulative composition between the first and second conductive materials; (cl. 70) and the block (i.e. shape of conductive material, 75) is aligned horizontally above the insulative material in at least one cross section.

5. Nabatame further discloses its second conductive material a rectangular block (Fig. 7), but does not appear to show etching into the shape wherein the sidewalls of the block are aligned vertically between the sidewalls defining the opening in at least the one cross-section.

6. Joo teaches the use of etching (Par. 0029)

7. It would have been obvious to one of ordinary skill in the art to incorporate an etching step to the electrode of Nabatame in order to in order to shape the material as taught by Joo (Par. 0029).

8. In regards to claim 55 that the sidewalls of the block aligned vertically with sidewall of the opening, applicant has not disclosed that the electrode shape and size are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. As such, it would have been obvious to one of ordinary skill in the art to form the electrode with the claimed shape and size, since it has been held that mere dimensional limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise

Art Unit: 2813

critical. See, for example, *In re Rose*, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

9. Claims 55, 59 and 70 are rejected under 35 U.S.C. 103(a) as being unpatentable over Agarwai et al. (U.S. 6,165,834) in combination with Marsh (U.S. 6,541,067) and Joo et al. (U.S. 2002/0056839).

10. Agarwai (Fig. 1, 2) discloses:

(cl. 55) a method of forming a conductive material, comprising: providing a semiconductor substrate (12); forming an insulative material (16) over the substrate, wherein the insulative material comprises sidewalls defining an opening extending to the substrate in at least one cross-section; forming a first conductive material (22) over the substrate and within the opening, the first conductive material comprising one or more of TiN, WN, TaN, elemental Ta, and elemental Ti; depositing a second conductive material (24) physically against the first conductive material, the second conductive material consisting essentially of a metal and being different than the first conductive material ("Ru"; Col. 3 , Lines 42-47),), wherein the depositing comprises: providing a metallo-organic precursor proximate the first conductive material, wherein the metallo-organic precursor comprises the metal and carbon ("tricarbonyl cyclohexadienyl"; Col. 3, Lines 42-47), forming the second conductive material physically against the first

Art Unit: 2813

conductive material without an insulative composition between the first and second conductive materials (.e. no intervening material);

(cl. 70) and the rectangular block (i.e. shape of conductive material, 24;; Fig. 1) is aligned horizontally above the insulative material (16) in at least one cross section.

11. Agarwai does not appear to explicitly disclose exposing the precursor to a reducing atmosphere to release the metal from the precursor, etching into the shape wherein the sidewalls of the block are aligned vertically between the sidewalls defining the opening in at least the one cross-section, or that the block is 450A.

12. Marsh exposes the precursor to a reducing atmosphere to release metal from precursosr (Abstract).

13. It would have been obvious to one of ordinary skill in the art to incorporate the process of Marsh in Agarwai in order to form the metallo organic material as required by Agarwai (item 24).

14. Joo teaches the use of etching (Par. 0029)

15. It would have been obvious to one of ordinary skill in the art to incorporate an etching step to the electrode of the Agarawai in order to shape the material as taught by Joo (Par. 0029).

16. In regards to claim 55 that the sidewalls of the block aligned vertically with sidewall of the opening and its size/thickness, see paragraph 8 of this office action.

Conclusion

Art Unit: 2813

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to James M. Mitchell whose telephone number is (571) 272-1931. The examiner can normally be reached on M-F 8:00-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jmm
October 14, 2005


CARL WHITEHEAD, JR.
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800